

Student Directions for Lady Bug Revolution

Introduction to Rotational Motion

Learning Goals: Students will determine

- The factors which affect angular velocity.
- The factors which affect velocity when spinning.
- How linear velocity is related to angular velocity.
- How to graph angular velocity, velocity and angle.

Student Instructions

1. Under show graphs click on θ , ω , v
2. Experiment with changing to location of the ladybug and beetle on the wheel. Watch the angular velocity. Do a data table with distance vs. angular velocity to prove your final conclusion. Click show ruler to measure distance. What do you think angular velocity is?
3. How does position relative to the center of the wheel affect the angular velocity?
4. Now, click radio button to show velocity. Experiment with changing to location of the ladybug and beetle on the wheel. How does position relative to the center of the wheel affect the velocity? Take several measurements and graph the change.
5. What other factors affect the velocity of the bugs?
6. Determine a mathematical relationship between velocity and all factors that affect it. Use the slope of graphs to determine.
7. Using the relationship determined above, write a problem to determine velocity of a bug. Use the ruler feature and other information from the simulation to test and solve your problem. Show all steps.

8. Did your mathematical relationship describing velocity prove correct? Explain how you know. If it is wrong then redo the experiment.
9. Under show graphs click on θ , ω , α
10. Set the ladybug to undergo angular acceleration. Describe the ladybugs motion. What does angular acceleration mean? Turn on the acceleration vectors. What direction is the angular acceleration? Explain why this direction makes sense.
11. Predict what the graphs of angle vs time, angular velocity vs time and angular acceleration vs time would look like for a ladybug undergoing angular acceleration.
12. Use the simulation to check your predictions.
13. Explain why your predictions made sense or how you fixed them to make sense.
14. Use the simulation to determine what factors upon which angular acceleration of the ladybug depends. Describe the relationships. (directly proportional, inversely proportional, etc.)
15. Describe how to achieve the greatest angular acceleration for the lady bug.